The Cork Floats Where?

Grades 4-6

Overview

The students ponder why a cork will float along the inside edge of a glass that is half-filled with water and in the very middle of a glass filled a drop over the brim. This activity's concepts are ***cohesion & adhesion***.

Objective

- The students will develop an understanding of water's cohesion and adhesion factors that determine, for example, where an object (i.e. cork) floats and how water acts.

Vocabulary

- **Meniscus:** The curved upper surface of a liquid.
- **Cohesion:** Mutual attraction by which the elements of a body (water) are held together.
- **Adhesion:** Physical attraction or joining of two substances.

Materials

For the presenter:

- a drinking glass
- one small cork (gummed reinforcements for punched paper holes work too)
- water
- eye dropper (optional, you will want to use it if you have one)

For each group of students:

- 1 small cork
- 1 eye dropper
- a glass half full of water
- a small container of water that will fill the glass up

For each student:

paper and pencil
Art Activity: ***Cork Frog or Fish***

- small cork
- 1 green pipe cleaner
- several colorful pipe cleaners
- crayons
- One - 16-inch piece of string
- colorful, square, plastic, bread tags (fins for fish)

For whole group:

- water in a large container for floating frogs and fish

Getting Ready

1. Have a glass half-filled with water and a cork next to it. Have a drawing of two empty glasses either on the blackboard or on the overhead.
2. Write the vocabulary words and their definitions on the overhead / blackboard.
3. Have art materials on a table for easy distribution.
4. Make sure each student has a piece of paper and a pencil to use.

Procedures

1. ***Focus***: Tell the students that you are going to fill your glass half full with water. Then draw the water line half way up on one of your glasses on the blackboard. Ask the students to draw a glass half-full of water on their paper. Tell them to signal you when they are finished by sitting quietly with their fist on their desk with their thumb up. Compliment certain groups or one side of the room by saying things like, "Good, this table is quiet and ready for directions. I am waiting for just a few more signals before I give the rest of my directions. Great!" Then show them the cork and explain that in a few minutes you will float the cork on the water surface, but before you do, they are to draw what they predict they will see when you do this and share their drawing with a neighbor or their table.
2. Without commenting on their placement of their corks, walk around the room observing the students' drawings of where their cork is floating. Walk to your drawing and tell the students that this is what most of their drawings showed; draw the cork floating in the middle. Ask how many of them have a similar drawing. Next ask, "How many of you are wondering what will actually happen when the cork is placed on the water surface? Let's find out!."

3. Share the objectives with the students.

4. Distribute group materials to students.

5. Float your cork on the water surface.

   Q. "Where does the cork float? ***(It should be next to the side of the glass. If it is in the middle, move it somewhat and it will go to the side.).*** Good scientist are keen observers, so listen carefully to my next question and double check your observations."

   Q. "Where is the water level highest in the half-filled glass?"

   [When the glass is half-full, the highest level is at the side or the circumference of the glass edge. This is a result of the adhesive forces between the water and the glass molecules. Since the meniscus, the curved upper surface of a liquid, is at the circumference, the cork floats there.]

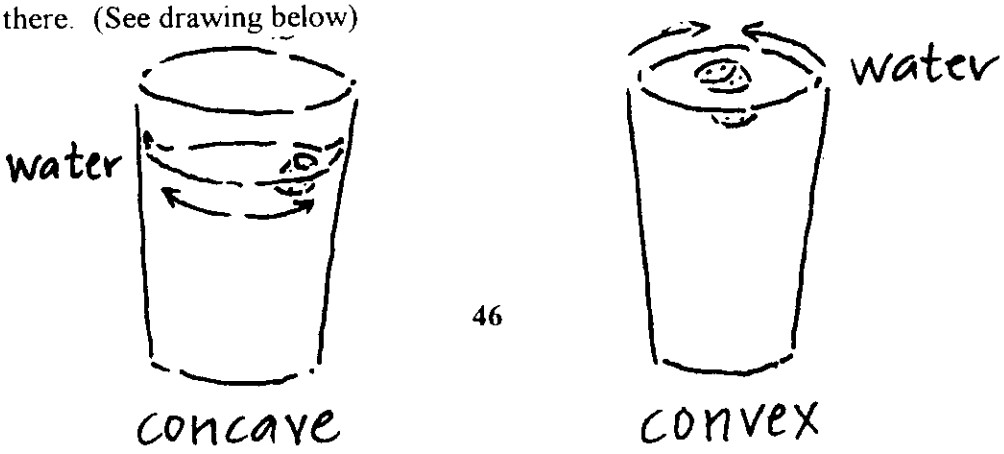
6. Now fill the glass to its brim, and if you have it, use an eye dropper to add several more drops of water. Have the students do the same, but they are **not** to float their corks yet. If you do not have an eye dropper, use your hand to shake several more drops of water until the water is slightly above the brim.

7. Ask the students to predict where the cork will float. Now float the cork. Ask the students to describe where their cork is floating. It should be floating in or near the center.

   Q. "Why is the cork is floating in the center of a full glass of water?"
   Q. "Where is the water level highest in a full glass?"
   Q. "Why is it possible to fill the glass more than full without the water overflowing?"
   Q. "What happens when you push the cork towards the edge? ***(It will not stay at the edge)"***
   Q. "Why does this happen?"

Explanation

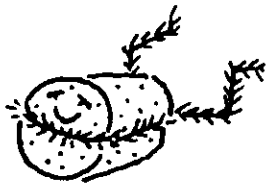
When a glass is filled to the brim with water, the surface tension and the cohesive forces between the water molecules form a film on the water surface which makes it possible to fill the glass more than full. The highest level of the meniscus is now in the center of the glass, which is why the cork floats there. (See drawing below)



Closure

Have each student draw two glasses of water with floating corks on them; one should be brim full and the other half-full. Students should be ready to explain why the corks are in the different positions in each glass. If the students are sitting in groups, have them share with each other their drawings and explanations. Then call on a few students to explain to the class.

Floating objects tend to float at the highest spots of the meniscus; consequently if a glass is half full the object ***(cork)*** will float at the side; and if the glass is filled to the brim-plus, the object ***(cork)*** will float at the center.



Art Activity: Cork Frog & Fish

Materials

For frog:

- cork (wine bottle corks work for the frog & fish)
- 1 green pipe cleaner
- one - 16-inch piece of string
- crayons **(DO NOT** use markers because the color washes off in the water)

For fish:

- teacher will need an exacto knife to cut slits for the fins.
- colorful, square, plastic, bread tags (fins)
- colorful pipe cleaners

Procedures

To Make A Frog

1. Color the cork's circular side and the narrow end with a green color crayon.
2. Draw eyes and mouth on the upper half of the large end of the cork with a black crayon.
3. Fold a green pipe cleaner in half.
4. Tie the string to the middle of the pipe cleaner at its fold.
5. Place the middle of the pipe cleaner in the middle of the large end of the cork.
6. Wrap the pipe cleaner around the sides of the cork and twist tightly together behind the small end of the cork.
7. Twist the remaining part of the cleaner at the small end into the shape of frog legs. See the drawing on the next page.)

To Make a Fish

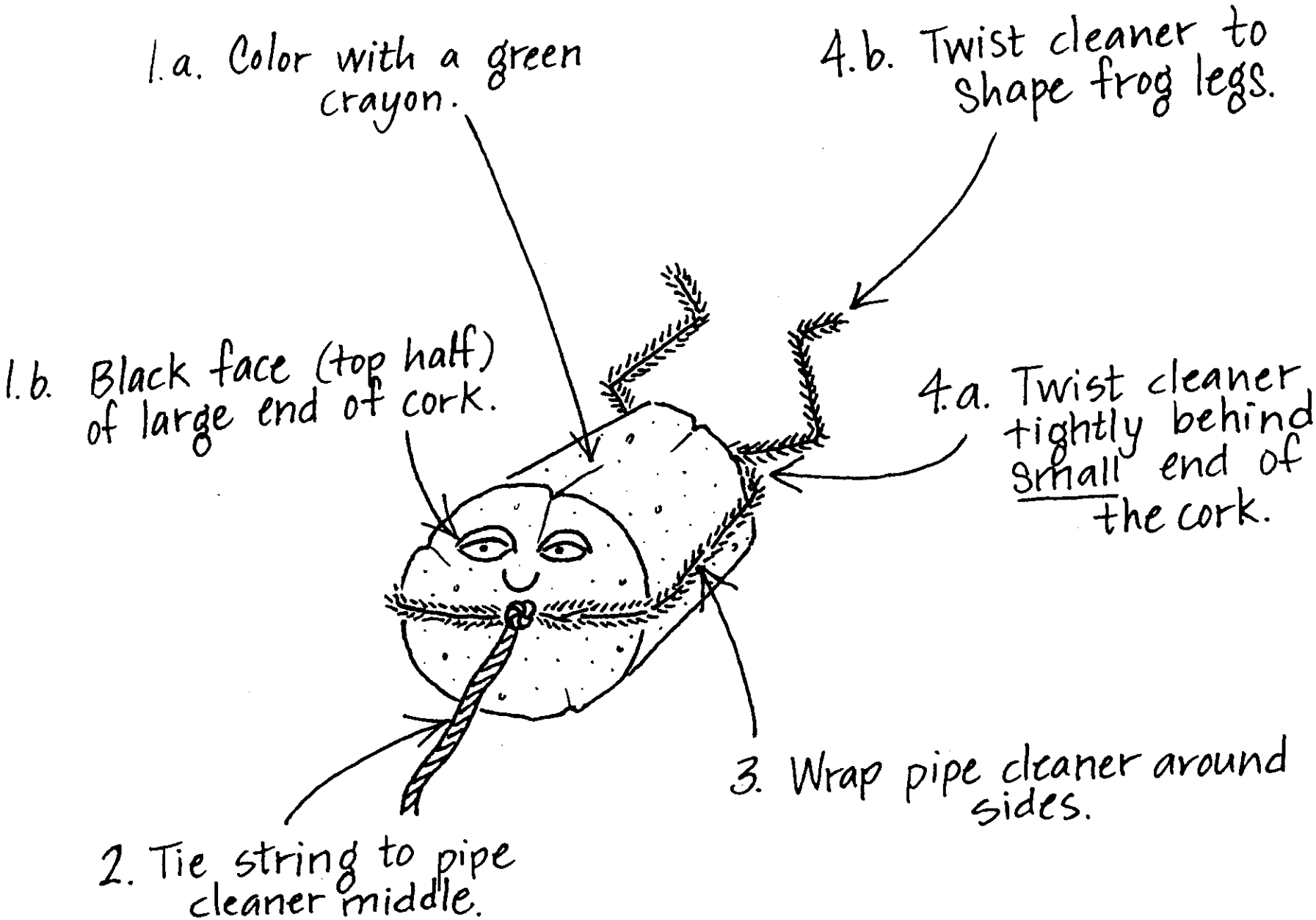
1. The teacher slits the corks with an exacto knife to slip in the plasticbread tabs.
2. Students should be CREATIVE!
3. Students design their fish on paper first.
4. After checking their drawings, have students get string, pipe cleaners, etc.

Closure for Art Activity

Float the frogs and fish in a sink or tub.

Clean Up

The last five minutes have every student work to leave the classroom as they found it.


1.a. Color with a green crayon.
4.b. Twist cleaner to shape frog legs.
1.b. Black face (top half) of large end of cork.
4.a. Twist cleaner tightly behind small end of the cork.
3. Wrap pipe cleaner around sides.
2. Tie string to pipe cleaner middle.